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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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09/943,180

08/29/2001

John T. Moore

MI22-1776

8591

21567

7590

03/03/2004

WELLS ST. JOHN P.S.
601 W. FIRST AVENUE, SUITE 1300
SPOKANE, WA 99201

EXAMINER

ROCCHEGIANI, RENZO

ART UNIT

PAPER NUMBER

2825

DATE MAILED: 03/03/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/943,180

Applicant(s)

MOORE ET AL.

Examiner

Renzo N. Rocchegiani

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2825

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 16 January 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-20 and 40-61 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-20 and 40-61 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date 5/05/2003, 06/12/2003, 01/16/ 2004.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 1-20 and 40-61 are rejected under 35 U.S.C. 103(a) as being obvious over U.S. Patent No. 5,731,235 (Srinivasan et al.) in view of European Patent No. 886308 A2 (Kobayashi et al.).

Srinivasan et al. discloses a process to form a capacitor wherein a first electrode (item 42, Fig. 9), of a silicon comprising material (col. 4, lines 5-15), is formed over a substrate (item 32, Fig. 9), wherein a dielectric region (items 62, 46, 47, 52 and 60, Fig. 9) is formed over the first electrode and wherein a second electrode (item 54, Fig. 9) is formed over the dielectric region. The dielectric region comprises a first oxide layer (item 62, Fig. 9) over the first electrode, a silicon nitride layer (item 46, Fig. 9) over the oxide layer, wherein the nitride layer comprises pin holes (item 47, Fig. 9), a silicon comprising layer (item 50, Fig. 6, see also item 20, Fig. 3 and col. 3, lines 37-47) is deposited over the silicon nitride, the silicon comprising layer is then nitridized to form a second silicon nitride layer (item 52, Fig. 9) without affecting the silicon comprising material inside the pin holes, finally an additional silicon oxide layer (item 60, Fig. 9) is deposited over the nitridized silicon comprising layer. Srinivasan et al. also disclose depositing the first silicon nitride layer at a temperature of

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400 degree C or above (col. 3, lines 18-24).

Srinivasan et al. do not specify the use of a silicon dioxide for the silicon comprising layer and do not disclose the use of a plasma for the nitridation process.

Srinivasan et al. further do not specify the spacing between the substrate and the electrode in the plasma chamber. Yet, Srinivasan et al disclose that other materials known in the art may be applied for their invention (see col. 4, lines 48-55).

Furthermore Srinivasan et al. discloses that silicon dioxide is not only a well known and typically preferred material in the formation of capacitor dielectric layers (see col. 1, lines 20-31) but it also is a good material to cure the pin holes in silicon nitride which is the problem they are addressing. (see col. 1, lines 43-49). Formation of silicon dioxide implies an oxidation step.

Kobayashi et al. teach the nitridation of silicon dioxide using a plasma. (See abstract).

It would have been obvious to one having ordinary skill in the specific art to combine the teachings of Srinivasan et al. to those of Kobayashi et al., and thus arrive at the claimed invention, since it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as a matter of obvious design choice. *In re Leshin*, 125 SUPQ 416. Furthermore, it would have been obvious to use plasma nitridation since as taught by Kobayashi et al., using a plasma will resolve a number of problems encountered in high thermal nitridation and since plasma nitridation of silicon dioxide will result in a modified oxide layer, i.e. the formation of silicon nitride. (See Kobayashi et al., col. 2 and col. 8). Finally, because it

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is well known in the specific art that the spacing between the plasma electrode and the substrate would affect the manipulation of the other variable such as power and pressure during the plasma process, such spacing is a result effective variable and thus discovering the optimum or workable ranges involves only routine skill in the art. *In re Aller*, 105 USPQ 233.

Response to Arguments

3. Applicant's arguments filed on January 16, 2004 have been fully considered but they are not persuasive. Applicant argues that the prior art cited does not render the present invention obvious because it does not read on a limitation found in the specification of the present application. What additional limitations are found in the specification of the present application is not at issue here. Patentability over prior art is determined on what is found in the claim language and not in the specification. The limitation the applicant refers to, i.e. that the "oxidation after forming nitride comprising layer 20 can effectively fill pin holes within layer 20 with silicon oxide derived from the underlying first capacitor electrode material", is nowhere in the claim language. Furthermore, applicant's argument that the present invention does not require a wet etching step as disclosed in the Srinivasan reference is also not persuasive because the claim language does not exclude the application of such a step. The claims pending in the present application have the transitional sentence "comprising" which is open ended and thus not exclusive of any additional process step. Furthermore, the amendment made by the applicant that adds the oxidation step to the claims does not overcome the prior art rejection because the prior art renders obvious the formation of silicon dioxide

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and thus the execution of an oxidation step since such step would be necessary to form the oxide material.

For these reasons the arguments presented by applicant are not deemed to be persuasive and the rejection stands.

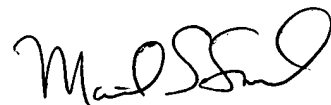
Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Renzo Rocchegiani whose telephone number is (571) 272-1904. The examiner can normally be reached on Monday through Friday from 8:30 am to 4:30 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Matthew Smith, can be reached at (571) 272-1907. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

RNR

February 10, 2004



MATTHEW SMITH
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2800